

## Description of Additional Supplementary Files

File Name: Supplementary Data 1

Description: Predictions from CHORD and CHORD-signature on the HMF, BRCA-EU, and PCAWG datasets as well as metadata for each sample

File Name: Supplementary Data 2

Description: Mutation contexts and mutational signatures extracted from the HMF, BRCA-EU, and PCAWG datasets

File Name: Supplementary Data 3

Description: List of 781 cancer and HR related genes used for the pan-cancer analysis of HRD and results of the enrichment analysis to determine HRD associated genes. The enrichment analysis was performed using one-sided Fisher's exact tests with multiple testing correction using the Hochberg procedure

File Name: Supplementary Data 4

Description: Genotypes of *BRCA1/2*, *RAD51C*, *PALB2* and other HR genes for the 310 CHORD-HRD patients from the HMF and PCAWG datasets

File Name: Supplementary Data 5

Description: Incidence and genetic cause of HRD by cancer type in the HMF and PCAWG dataset

File Name: Supplementary Data 6

Description: Pathogenicity scoring of variants used to determine biallelic gene status, including biallelic pathogenicity score inclusion criteria for CHORD training data

File Name: Supplementary Data 7

Description: Details for the novel, potentially pathogenic variants of unknown significance (VUS)